What is claimed:

Sub a1

1. An optical fiber provided with a refractive index profile having a central core; a middle part provided around the outer periphery of said central core and having a lower refractive index than that of said central core; and a cladding provided around the periphery of said middle part and having a higher refractive index than said middle part and a lower refractive index than said central core; wherein

said optical fiber has an effective core area of 120 μm^2 or more in an employed wavelength band selected from the range of 1.53~1.63 μm, and has a cut-off wavelength that is capable of substantially single mode propagation in said employed wavelength band.

2. An optical fiber according to claim 1, characterized in that the effective core area is 140 μm^2 or more.

3. An optical fiber according to claim 1, characterized in that the bending loss is 100 dB/m or less.

4. An optical fiber according to claim 1, characterized in that the bending loss is 20 dB/m or less.

Sub a2

5. An optical fiber according to claim 1, characterized in that the effective core area is 120 μm^2 or more, and the increase in the sandpaper tension winding loss is 10 dB/km or less.

6. An optical fiber according to claim 1, characterized in that the effective core area is 120 μm^2 or more, and the increase in the sandpaper tension winding loss is 1 dB/km or less.

7. An optical fiber according to claim 1, characterized in that the effective core area is 120~150 μm^2, and the increase in the sandpaper tension winding loss is 0.3 dB/km or less.

8. An optical fiber according to claim 1, characterized in that, when the radius of the central core is designated as r_1 and the radius of the middle part is designated as r_2, then $3.0 \le r_2/r_1 \le 5.0$, and, when specific refractive index differences for the central core and the middle part are designated as Δ_1 and Δ_2 respectively where the refractive index of the cladding is taken as the standard, then Δ_1 is 0.30% or less and Δ_2 is -0.05~-0.15%.

Sub a3

9. An optical fiber according to claim 8, characterized in that Δ_1 is 0.26% or less.

10. An optical fiber according to claim 8, characterized in that Δ_2 is -0.05~-0.15% or less.

Sub A4

11. An optical fiber according to claim 1, characterized in that a ring core is provided in between the middle part and the cladding, said ring core having a higher refractive index than that of said middle part and said cladding, and a lower refractive index than that of the central core.

12. An optical fiber according to claim 11, characterized in that,

when the radius of the central core is designated as r_1, the radius of the middle part is designated as r_2, and the radius of the ring core is designated as r_3, then $3.0 \le r_2/r_1 \le 4.0$ and $4.0 \le r_3/r_1 \le 5.0$, and,

when the specific refractive index differences for the central core, the middle part, and the ring core are designated as Δ_1, Δ_2 and Δ_3 respectively where the refractive index of the cladding is taken as the standard, then Δ_1 is 0.35% or less, Δ_2 is 0~-0.2%, and Δ_3 is +0.05~+0.2%.

Sub A5

13. An optical transmission system characterized in that a dispersion compensating optical fiber is disposed to the side of the optical fiber according to claim 1 at which the optical signal is emitted, said dispersion compensating optical fiber compensating one or both of this optical fiber's wavelength dispersing value and dispersing slope.

14. An optical transmission system according to claim 13, characterized in that the dispersion compensating optical fiber is provided with a core and a cladding that is provided around the outer periphery of said core, said core consisting of a central core having a higher refractive index than said cladding, a middle part that is provided around the outer periphery of said central core and has a lower refractive index than said cladding, and a ring core that is provided around the outer periphery of said middle core part and has a higher refractive index than said cladding; wherein:

when the radius and the relative refractive index difference, with the cladding taken as the standard, for the central core, middle part, and ring core are designated as (r_1, Δ_1), (r_2, Δ_2) and (r_3, Δ_3), respectively, then r_1 is 2~3 μm, Δ_1 is 0.9~1.5%, Δ_2 is -0.35~-0.45%, Δ_3 is 0.2~1.2%, r_2/r_1 is 2.0~3.5, and r_3/r_4 is 3.0~5.0;

a cut-off wavelength is provided that is capable of substantially single mode propagation, in which the effective core area is 20 μm^2 or more, the bending loss is 40 dB/m or less, and the wavelength dispersion is -65~-45 ps/nm/km, in an employed wavelength band selected from the range 1.53 μm~1.63 μm; and

the dispersion slope compensation ratio is in the range of 80~120% when compensating said optical fiber with a length of the dispersion compensating optical fiber capable of

compensating to zero the wavelength dispersion of the optical fiber to be compensated.

15. An optical fiber according to claim 13, characterized in that the dispersion compensating optical fiber has effective core area being 25 μm^2 or more.

16. An optical transmission system according to claim 13, wherein the average wavelength dispersion value when an optical fiber and a dispersion compensating optical fiber are combined is in the range of -6~+6 ps/nm/km.